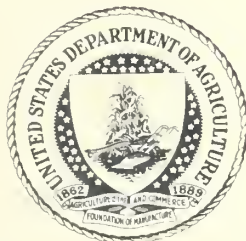


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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JANUARY 1938

Vol. VI, No. 3

(Not for publication)

March 1, 1939

ADMINISTRATION

The following paragraphs deal with the retirement of two employees that have given long service to the entomological work of the Department of Agriculture.

T. A. KELEHER

Thomas A. Keleher, who retired on November 30, 1938, from the Bureau of Entomology and Plant Quarantine, had been with the United States Department of Agriculture for nearly 55 years. He was born and educated in the District of Columbia and came into the Department as a 15-year-old messenger on January 2, 1884. His first duties with the Department were to feed and care for experimental lots of silkworms, to copy letters, and to care for insects which were being bred by the entomologists. In 1891 the silkworm rearings were discontinued and Mr. Keleher was assigned additional clerical duties. In 1902 Congress appropriated \$10,000 to study the possibility of silkworm culture in this country and Mr. Keleher was again connected with the work. The Department stopped its silkworm research in 1908. For the last 30 years of his service Mr. Keleher's work was the classification of the Bureau's correspondence.

R. S. CLIFTON

Richard S. Clifton, senior administrative assistant, Division of Japanese Beetle Control, was retired on January 31. Mr. Clifton's services with the Department have been continuous since his first appointment in November 1890. For many years he served as executive assistant to L. O. Howard, while the latter was chief of the Bureau. From about 1914 to 1919 he served as administrative assistant on gypsy moth control under A. F. Burgess at Melrose Highlands, Mass., following which he assumed charge of the eastern divisional European corn borer control office at Boston. After the revocation of the corn borer quarantine in July 1932, Mr. Clifton became administrative assistant to H. N. Bartley, in charge of the Boston district office supervising gypsy moth and Japanese beetle quarantine enforcement in New England. Mr. Clifton was active in the USDA Club of Boston. He resided at Hanover, Mass.

BENJAMIN FRANKLIN ON INSECTS

Perez Simmons, of the Fresno, Calif., laboratory of the Division of Fruit Insect Investigations, calls our attention to an interesting paragraph by Benjamin Franklin written June 11, 1760, in a letter to Miss Mary Stevenson, in Winsted, Essex, while Franklin was in London. This is published in Carl Van Doren's "Benjamin Franklin" (245 pp., illus., 1938).

"Superficial minds are apt to despise those who make that part of the creation (insects) their study, as mere triflers; but certainly the world has been much obliged to them. Under the care and management of man, the labours of the little silkworm afford employment and subsistence to thousands of families and become an immense article of commerce. The bee, too, yields us its delicious honey, and its wax useful to a multitude of purposes. Another insect, it is said, produces the cochineal from whence we have our rich scarlet dye. The usefulness of the cantharides, or Spanish flies, in medicine is known to all, and thousands owe their lives to that knowledge. By human industry and observation other properties of other insects may possibly be hereafter discovered, and of equal utility. A thorough acquaintance with the nature of these little creatures may also enable mankind to prevent the increase of such as are noxious, or secure us against the mischiefs they occasion."

FRUIT INSECT INVESTIGATIONS

Control of peach borer with cages.—Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that 105 peach trees in the laboratory experimental orchard were artificially infested with newly hatched peach borer larvae in 1937 and the base of each tree was kept caged during the moth emergence in 1938. There were 4,200 peach borers placed on the trees in 1937, or an average of 40 larvae per tree. A total of only 47 borers were found in all the trees during the winter of 1938-39. There were no borers in 77 of the 105 trees, although many empty cocoons and cast pupal skins were found around the trees under the cages at and below the ground line. The results indicate good control of the peach borer by the use of cages under experimental conditions, and indicate that commercial control could be expected in an isolated peach orchard, provided all of the trees were caged to prevent the escape of the moths that emerged from the trees that were borer infested.

Flight habits of *Leucophloeus* sp.—About 9,700 small beetles of this genus, which are found in stored raisins, were taken in a rotary net during 6½ months of operation in a raisin-storage yard in Fresno, Calif. The catches, recorded by Dwight F. Barnes and George H. Kaloostian, of the Fresno laboratory, increased from zero in April to 3,329 in July and declined to 155 in October. As shown by the following condensed record of catches removed from the net at 15-minute intervals on July 14, the main flight of *Leucophloeus* occurs at about sunset and a secondary flush of flight takes place in the early part of the morning. On July 14 sunrise was at 4:50 and sunset at 7:19.

Time	: Beetles	::	Time	: Beetles
	: taken	::		: taken
<u>a.m.</u>	: <u>Number</u>	::	<u>p.m.</u>	: <u>Number</u>
5:30-6:00-----	: 3	::	2:00-3:00----	: 1
6:00-7:00-----	: 8	::	3:00-4:00----	: 3
7:00-8:00-----	: 14	::	4:00-5:00----	: 1
8:00-9:00-----	: 5	::	5:00-6:00----	: 3
9:00-10:00-----	: 3	::	6:00-7:00----	: 77
10:00-11:00-----	: 1	::	7:00-7:45----	: 404
<u>p.m.</u>	:	::	7:45-8:15----	: 22
1:00-2:00-----	: 1	::		

MEXICAN FRUITFLY CONTROL

Fruitfly catches in January.--Traps were operated on approximately 500 premises in the Rio Grande Valley in January and adults of Anastrepha ludens Loew were found on 112 of them. Of the 154 flies taken, 70 were females, 38 percent of which were gravid. Although no larvae have ever been found in January, immense quantities of fallen fruit were examined in the field this last month. Inspectors estimate that 40 percent of the fruit has been harvested. Shipments to date total 15,475.7 equivalent carlots, which is 4,055.9 equivalent carlots more than was shipped to the same date last season. Extension of the harvesting season to June 15 for Valencia oranges was announced on January 27. This modification in no way affects the close of the harvesting season for grapefruit, which is now set at April 30.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Spring wheat resistant to hessian fly.--Elmer T. Jones, Manhattan, Kans., reports that of a series of 604 varieties and selections of spring wheats, fall tested for resistance to hessian fly in the Springfield, Mo., test plots, only 7 were found to be resistant to infestation. The resistant strains, with infestations ranging from 0 to 4 percent, were: Centenario Portugal F.P.I. 116311, T. vulgare F.P.I. Nos. 124367 and 125390, T. pyramidale recognitum F.P.I. Nos. 113397 and 113398, and T. timopheevi F.P.I. 94761. Infestations of other strains in the test ranged from 22 to 100 percent of the plants infested. The average infestation of Ceres, susceptible, checks was 97 percent. The average infestations of the resistant checks Marquillo and Illinois No. 1 W 38 were 1.5 and 0 percent, respectively.

Hessian fly ecology study terminated.--The study of the effect of moisture and other ecological factors on hessian fly abundance, conducted by J. R. Horton at Wichita, Kans., has now reached the stage where its continuation is not considered warranted, in view of other more urgently needed work. This study is therefore being terminated and Mr. Horton is being assigned to ecological studies of grasshoppers in the southern Plains States, his headquarters remaining at Wichita.

Amazon flies recovered in Louisiana sugarcane fields.--A total of 1,222 Amazon flies, *Metagonistylum minnas* Towns., were bred and released in 11 fields in Louisiana and in 3 fields in Florida in 1938 to control the sugarcane borer. T. E. Holloway and W. E. Haley, of the Houma, La., laboratory, recovered these parasites in 6 of the 7 release fields in Louisiana in which recovery examinations were made. On Southdown Plantation, near Houma, 52.3 percent of the borer stages were parasitized in 100 infested stalks of cane in October in a field where 145 flies were released mainly during July. Percentages of parasitization in the other 5 fields were 8.4, 13.7, 22.1, 44.6, and 50.0.

Borer infestation in variety test fields.--Commercial and promising varieties of sugarcane being grown in variety test fields were examined for sugarcane borer infestation during November and December by J. W. Ingram, W. E. Haley, and others of the Houma, La., laboratory. These test fields are conducted by the Sugar Plants Division of the Bureau of Plant Industry. The percentages of joints bored were determined for 20 stalks in each of 5 replicates of each variety in each of 5 plant-cane test fields and in 5 first-year stubble-cane test fields. Results of these examinations in average percentages of joints infested and the low level of significance of the varietal differences, as determined by the analysis of variance method, follow:

Test field	: C.P. :	Co. :	C.P. :	C.F. :	C.P. :	C.F. :	C.P. :	C.F. :	Co. :	C.P.
field	:29/116:	281	:29/137:	29/320:	31/509:	32/202:	25/11:	25/19:	290	:29/120
Plant----	: 35.5 :	30.5 :	30.0 :	29.4 :	25.8 :	24.9 :	24.8 :	24.2 :	20.6 :	--
Stubble--:	31.9 :	25.1 :	-- :	22.9 :	-- :	-- :	23.4 :	20.0 :	17.6 :	11.4

Low level of significance for varietal differences: Plant cane, 5.4 percent; stubble, 5.6 percent.

JAPANESE BEETLE CONTROL

Reduction in Christmas-tree inspections.--There was a reduction of 55 percent in the number of Christmas trees inspected in 1938, as compared with the 1937 season. During the past November and December, 343,398 trees were inspected and certified for shipment from the lightly infested gypsy moth area. The situation is explained in part by the removal from the lightly infested gypsy moth regulated area of 26 towns in New Hampshire and Vermont. The area from which trees might be shipped under certification was also decreased by the transfer of 54 towns in Maine, New Hampshire, and Vermont from a lightly infested to a heavily infested status, automatically embargoing the movement of trees from these 54 towns. All trees inspected in 1938 were found free from gypsy moth egg masses.

Special handling of logs from hurricane area.--The first carload of logs to be cut in the New Hampshire hurricane area was inspected and certified at Conway, N. H., for shipment by the New Hampshire Timber Salvage Administration to the Forest Service laboratory at Madison, Wis. When the shipping order was received the logs were in the woods, covered with ice and snow. To permit immediate inspection, the logs were hauled to a shipping point where the ice and snow were satisfactorily removed by steam from an upright boiler such as is used by highway departments in thawing frozen culverts and ditches.

Fourteen gypsy moth egg clusters were discovered, creosoted, and removed from the 8,000 board feet of three grades of pine logs included in the shipment.

Hurricane shortens crop of evergreen boughs.--Spruce boughs inspected and certified for shipment to points outside the gypsy moth regulated areas amounted to 746 tons (14,922 bales), or a 45-percent reduction from the quantity certified in 1937. The decrease of 600 tons is partially due to the hurricane of September 21, which left spruce-bough lots in western Massachusetts and southern Vermont in poor condition. The baled boughs were certified for shipment on the basis of inspections of cutting lots in 91 localities. Nine egg clusters were found on 6 lots in Vermont and 1 lot in Massachusetts. Boughs were not inspected if shipped from lots near which egg clusters were found. Six hundred acres of bough lots in Massachusetts and 2,300 acres in Vermont were scouted in connection with the marketing of this crop.

Gypsy moth permits of three nurseries revoked.--Finding of gypsy moth infestation in the vicinity of three large nurseries in the Manchester, Conn., district resulted in the cancelation of permits under which these establishments had been permitted free movement from the regulated area of all their stock.

Infested articles inspected.--Among the consignments of quarantined products inspected during the month were 11 lots from which 111 gypsy moth egg clusters were removed. Twenty-two egg clusters were removed from 3 cords of birch fireplace logs. Twenty-one egg masses were found on 2 carloads of lumber inspected at Deering Junction, Maine, for shipment to North Tonawanda, N. Y. Other infested shipments comprised lumber, birch-bark novelties, logs, and exhibit material.

Material inspected for nature exhibit.--Gypsy moth inspectors in the Portland, Maine, district examined 3 tons of rocks, cut hardwood trees, and poplar trees for shipment from Readfield, Maine, to the Boston "Sportsmen's Show." Thirty-three egg clusters were found on these articles. After the Boston show the entire exhibit will be transferred to New York City.

Methyl bromide experiments continued with promising results.--Trials with methyl bromide as a fumigant for potted plants have attracted considerable attention among nurserymen and greenhousemen. This work is performed in cooperation with the Division of Control Investigations. These trials are unlike the usual run of laboratory tests in that the fumigation is done at commercial establishments with plants furnished by the growers. The plants are then replaced in the greenhouses and handled in the usual manner. The growers are thus able to judge the results of the tests without awaiting accumulation of laboratory data. Many of the nurserymen present at the annual meeting of the New Jersey Association of Nurserymen held in Trenton during January spoke very favorably of the methyl bromide treatment.

New business contacted.--During the month an inspector from the New Cumberland, Pa., field office made a preliminary examination of an establishment set up in woodland area near Harrisburg for the purpose of gathering natural woodland plants and moss to be made up into glass gardens. The package is made up and covered with cellophane for disposal through one of the 5- and 10-cent chain stores in the East and Middle West. Arrangements were made

for the certification of the plants, moss, and small quantity of sand placed in each package. All materials used are collected in the vicinity of the packing shed. Most of the shipments are to be made within the Japanese beetle regulated area, but some large orders are booked for the West so that considerable certification will be required until Easter.

Philadelphia office moved.--On December 29 the Division was compelled to relinquish space occupied by the Philadelphia district office in the Frankford Arsenal. Temporary quarters were located at the Moorestown, N. J., research laboratory. This arrangement was continued until February 1, when they were moved to 6905 Torresdale Avenue, Philadelphia. The new telephone number is Mayfair 1221.

Autogiro activities.--Aerial scouting is still in progress in the Stokes State Forest area in New Jersey and the Pine Plains and Stony Point areas in New York. These are the three areas selected for surveys to determine the cost of elm elimination in mountainous sections. The aerial timber damage survey conducted for the New Hampshire Fire Hazard Reduction and Timber Survey Commission was completed on January 11. The following day the personnel manning autogiro NC-2740 returned to the Department's airport at Freakness, N. J. Officials in charge of the work estimated that the aerial survey was accomplished 837 times faster than would have been possible with timber-cruising crews.

Elm-sanitation activities in West Virginia and Maryland.--Poor road conditions in that section of West Virginia near Wiley Ford have made it difficult for the Cumberland, Md.-Wiley Ford, W. Va., crews to reach their work sites quickly and safely. Accordingly, a rowboat was furnished for use in getting to work sites that ordinarily would be reached by hazardous mountain roads. Throughout the sanitation area which follows the Potomac River between Pinto, Md., and Spring Gap, Md., elm logs have been allowed to remain at reasonable intervals for the purpose of trapping Hylurgopinus rufipes (Eich.) present in the area. Trap logs will also be placed east of Spring Gap and west of Pinto for distances of 8 miles in either direction.

Indianapolis confirmations.--Two cases of the Dutch elm disease were confirmed in Indiana during the month. Both trees were located near Crown Hill Cemetery, in Indianapolis. One of the trees was located 4 feet north of a previously diseased tree. The second confirmation was found 4 feet west of the initial confirmation at this point. In the course of selective sanitation, both of these trees were top and trunk sampled and discoloration was observed, although they appeared to be of high vitality. Each tree measured 13 inches DBH. They were both removed when the specimens were taken for culture.

Dutch elm disease eradication in Pennsylvania.--Contact workers in Upper Merion Township, Bucks County, Pa., have obtained permission for elm-sanitation work on 1,000 acres, representing about 5,500 dead or devitalized elms. Five Pennsylvania crews are at work on 2 large islands in the Delaware River where elms are in extremely poor condition, owing to injury by ice and storms. Much beetle work has been noted and many beetles have been found in all stages of development.

Athens, Ohio, clean-up.--Considerable work was necessitated by the Athens crew in cleaning up brush and elm debris left by line-clearance crews and residents of the town. Many home owners had their elms dehorned and the sawed-off branches were generally left on the property. This initial clean-up of the town has been completed.

FOREST INSECT INVESTIGATIONS

Winter kill among Black Hills beetle larvae.--J. A. Beal, of the Fort Collins, Colo., laboratory, reports that during a sudden drop in temperature to -5° F. on November 6, 1938, considerable mortality occurred among the overwintering larvae of Dendroctonus ponderosae Hopk. on the Pike National Forest, in central Colorado. Apparently because of the mild fall weather preceding the freeze, the larvae had not progressed very far in the winter-hardening process. Mortality varied according to the bark thickness of the host. In general, very thin bark--1/4 inch and less in thickness--showed high mortality, ranging from 50 to 100 percent. Under bark from 1/4 to 1/2 inch in thickness mortality averaged about 50 percent. In bark between 1/2 and 3/4 inches thick mortality averaged less than 25 percent, with little or no mortality under thicker bark. Total mortality averaged slightly less than 30 percent. About the only advantage of the freeze as affecting present control work is the fact that infested limbs will no longer need to be treated.

Evidence of second brood of pandora moth in Colorado.--According to N. D. Wygant, recent evidence obtained at the Fort Collins, Colo., laboratory indicates that there may be 2 broods of the pandora moth in the infestation on the Arapaho National Forest. Ordinarily there is only 1 brood of the pandora moth in an infestation, the moths emerging every 2 years and the larvae causing heavy defoliation every other year, or during the second year of feeding. There was a heavy flight of moths in the infestation during 1938, the brood of which are now overwintering on the trees in the second and third larval instars. Ranger D. O. Johnson sent to the Fort Collins laboratory some pupae for rearing which he collected in one area during the fall of 1938 where there were 8 to 10 pupae per square foot, and these appear to represent a second brood. During the winter several moths have emerged from these pupae. There should, therefore, be an emergence of second-brood moths in certain areas during 1939, contrary to past history of the insect. This will mean that there may be 2 broods of the insect present in the infestation in the future and that heavy defoliation may occur every year instead of every 2 years.

Pine-beetle-survey data summarized.--The field work of surveying 11,000,000 acres of ponderosa pine forests in Oregon and Washington was completed in October, according to F. P. Keen, of the Portland, Oreg., forest-insect laboratory. Reports have been prepared and issued covering all of the pine forests in Washington and two important areas in Oregon. Remaining reports on Oregon areas will be issued as rapidly as compilations are completed.

Godfather to a springtail.--A new species of Collembola, Arrhopalites whitesidei Jacot, was collected in 1937 by J. M. Whiteside, of the Portland, Oreg., laboratory, while it was depopulating a formicary of the mound-building ant Formica exsectoides Forel near Branford, Conn.

Mountain pine beetle parasites decrease.--As a result of detailed mark analysis of western white pine trees infested with the mountain pine beetle, W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, reports that beneficial insects attacking this beetle have decreased in abundance during the last 2 years within the 2 areas studied on the Coeur d'Alene National Forest. In 1936 parasites and predators of the mountain pine beetle averaged 7.1 per square foot of infested bark. In 1937 they had decreased to 4.9 per square foot, and in 1938 an additional decrease brought the average to 2.5 per square foot. This mortality among beneficials was not constant for each species, however, and appeared to be greatest among insects that pupate within definite pupal cases. Among the parasites, 2 small chalcids increased in 1937 and 1938, while Coeloides dendroctoni Cush. alone showed a decrease. Among the predators, Phaenicia pudica Hall suffered such a severe mortality that not a single larva was found in 1938, while Lonchaea viridana Meig. decreased from 1.08 per square foot in 1936 to 0.01 per square foot in 1938. Three other predators changed but slightly in abundance during the 3 seasons.

Dutch elm disease in Europe discussed at meeting.--At a meeting held at the Dutch elm disease laboratory at Morristown, N. J., on February 2, J. M. Walter, of the Bureau of Plant Industry, and D. E. Parker, of this Bureau, discussed the Dutch elm disease and the insect vectors of the causative fungus from a European standpoint. Messrs. Walter and Parker returned to Morristown last fall after having spent over 3 years in studying the disease and its vectors in Europe. With their headquarters at Oxford, England, they traveled in Holland, Belgium, France, Germany, Czechoslovakia, and Italy. Their talks were illustrated with slides and were based on observations that they made in these countries and on information they obtained from those who have studied the disease there. The meeting was attended by about 30 persons. Those included members of the Bureau of Plant Industry and the Bureau of Entomology and Plant Quarantine stationed at Morristown, N. J., members of the Bureau of Entomology and Plant Quarantine who are engaged in Dutch elm disease eradication and stationed at Bloomfield, N. J., members of the New Jersey Department of Agriculture, and members of the Cornell University Agricultural Experiment Station who are engaged in research work on the Dutch elm disease at Bayce Thompson Institute, Yonkers, N. Y.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Old unhatched egg cluster found in Vermont barrier zone area.--While scouting by the 1/4-mile strip method early in January, a scouting crew located a gypsy moth egg cluster in the town of Hancock, Addison County, Vt. The cluster was creosoted and forwarded to the gypsy moth office to determine whether or not it was fertile. Apparently this cluster was deposited during the summer of 1937 and, although fertile, it failed to hatch last spring. Living infestations have previously been found in the adjoining towns of Goshen, Granville, and Ripton. Evidently these infestations became established by windspread from infested areas east of the barrier zone.

Five small infestations found in barrier zone section of Vermont.--A single-egg-cluster gypsy moth colony was found in Granville, Vt., during the week of January 9-14. This makes a total of 5 single-egg-cluster infestations discovered in this town during the present fiscal year. Granville is located just within the barrier zone in the central part of Vermont.

Infestations found in town bordering the barrier zone.--An employee of the Bureau of Entomology and Plant Quarantine, engaged in bough-lot-inspection work, discovered a single gypsy moth egg cluster in the town of Plainfield, Mass., about the middle of December. As Plainfield borders the barrier zone, it was decided to modify the plan of scouting and treatment work east of the zone so that a small force of W. P. A. workers could be temporarily assigned to that town to determine whether or not additional infestations existed in the locality. Work was begun on December 19, 1938, and 1,886 acres of woodland and open country had been scouted up to January 7. Six infestations, totaling 20 egg clusters, were found in the area. Because of the discovery of these infestations, work will be continued in Plainfield for an indefinite period.

Small infestation endangers barrier zone in southern Massachusetts.--A small gypsy moth infestation was recently located in the township of Tolland, Mass., which borders the barrier zone town of Sandisfield on the east and is just north of the Connecticut State line. The infestation is situated on a high elevation and is favorably located for windspread into a very rugged and heavily wooded section of the barrier zone. Intensive control measures will be adopted to eradicate this important colony.

No gypsy moth infestations found in New Jersey by State employees.--A report from the State of New Jersey employee directing gypsy moth activities in that State indicates that the small force of State employees assigned to duty under his direction spent a large amount of time in examining the heavily wooded areas along the New York State line south of the Shawangunk, N. Y., infestation. They have also performed a limited amount of work in a swampy area in the region of South Brunswick, near sites of infestations found there several years ago. No evidence of the gypsy moth has been found in New Jersey to date.

Progress made in burning accumulated brush.--Unskilled laborers in the Pennsylvania area have made good progress in disposing of forest debris that accumulated as a result of ground work and selective thinning of favored food species done in that section by gypsy moth crews. During the last week in January, 19 of these men burned 700 piles of brush which averaged more than a cord to each pile. As a result of this work, 44 acres of woodland were put into satisfactory condition preparatory to scouting, burlapping, and spraying.

Extreme precautions used in scouting powder-company property.--Gypsy moth scouting work was begun during the first part of January on the grounds of the Dupont Powder Company, located in Pittston Township, Pa. The company officials required each employee of this project to wear rubber shoes and to submit to a search for matches, cigarettes, and other inflammable articles before entering the gates of the property. A guard, furnished by the company, remains with the crew at all times while scouting is in progress.

Beaver dam floods woodland area.--Gypsy moth workers engaged in scouting a large woodland area in Lackawanna Township, Lackawanna County, Pa., report that beavers have dammed up a stream in one section of the woodland. This caused a swampy area of considerable size to become flooded to such an extent that the territory could not be scouted until the ice froze sufficiently to bear the weight of the workers.

C. C. C. work in Connecticut concentrated in large, heavily infested area.—Practically all of the C. C. C. gypsy moth work done in Connecticut in January was performed in the dense and extensive infestation in the Granby-Simsbury region. Creosoting of egg clusters on tree trunks up to a height of 5 or 6 feet has been done throughout this area, approximately 350 acres of woodland have been selectively thinned, and much of the accumulated brush and forest debris has been burned. To the end of January, approximately 2,900,000 gypsy moth egg clusters had been creosoted or destroyed by burning. The work from now until hatching time will consist principally of going over the area again and creosoting egg clusters that can be reached from the ground with poles, and climbing many of the most heavily infested trees and creosoting the higher situated egg clusters. By this method, the greatest possible number of egg clusters will be destroyed before spring.

Forest-fire-reduction work may prevent C. C. C. gypsy moth work requested by State of Vermont.—The State of Vermont has requested the preparation of a plan for C. C. C. gypsy moth work, to be supervised by this Bureau, for the 13th and 14th enrollment periods, which extend from April 1, 1939, through March 31, 1940. Plans of work, based on the numbers of men available at the time of the flood and hurricane of September 21, 1938, have been submitted, but it appears that practically all of the men in camps in which gypsy moth work has been performed under the supervision of this Bureau will be needed on forest-fire-reduction work for a considerable period, and it may be impossible to grant the request at the present time.

PLANT DISEASE CONTROL

Minimum age of common barberry bushes at time of first fruiting.^{1/}—In the summer of 1930 many seeds of common barberry were sown in experimental plots near Maumee, Lucas County, Ohio, to extend our knowledge of the effect of various environmental conditions on the germination of common barberry seeds and the survival of the resultant seedlings. An accurate record was kept of the seedlings appearing and surviving each year until the end of 1936, when the experiment was closed. Although these seedlings were 5 years old, none of them had flowered or fruited. Since there were many seedlings in definitely located plots, this was considered an ideal opportunity to study the minimum age of fruiting in common barberry seedlings. All bushes were approximately the same age and some of them had reached a height of about 2 feet. Ten seedling bushes were left in each of five plots and one in another plot. These were inspected in the summer of 1937 and again in 1938 and notes were taken on the size, number, and condition of the bushes. The plants in all of the plots appeared healthy and in good condition and all displayed a satisfactory length of new growth. The results of the observations are reported in the accompanying table. A study of this table shows that the plants in most cases were larger in 1938 than in 1937. The size of the plants is best described in terms of length, rather than height. Although all of the plants grew during the spring of 1938, not all show an increase in height, because new growth is not always an extension of the last year's growth, but

^{1/}Dr. W. G. Stover, of the Botany Department, Ohio State University, recorded and compiled these data.

often arises from a lateral bud lower down on the stem. No evidence of flowering or fruiting could be found in any of the plots. The bushes are now 7 years old and no berries have been found on them at any time. It is possible, however, that the droughts of the last few years have delayed fruiting of these plants. The following table shows the conditions in the "Age of fruiting" plots near Maumee, Ohio, in 1938.

Type of plot	Plot: Number of bushes, :			Condition: of :		Maximum length: of plants :		Bushes : fruiting	
	: num- : by years :			: of :		: of plants :		: fruiting	
	: ber :	1936:	1937:	1938:	plants :	1937 :	1938 :	:	
						Inches	Inches	Number	
Well-drained soil, partial shade-----	1	10	10	10	Good	29	48	None	
Well-drained soil, full shade-----	2	10	8	7	Good	13	22	None	
Well-drained soil, full shade-----	3	10	10	10	Good	14	20	None	
Poorly drained soil, full sun-----	4	1	1	1	Good	36	36	None	
Well-drained soil, partial shade-----	5	10	10	10	Good	24	26	None	
Well-drained soil, partial shade-----	6	10	10	10	Good	32	48	None	
Total-----	--	51	49	48	--	--	--	--	

Blister rust kills pine rapidly in unprotected sections of western Washington.--Western white pine stands in the Douglas fir region of western Washington, while rather numerous, are not, in most cases, of sufficient acreage and value to justify the cost of protection, and practically no Ribes eradication has been carried out in this area, except in the Mount Rainier National Park. Members of the staff of the Spokane blister rust control office visited that section in the fall of 1938 to observe the spread of blister rust under unprotected conditions. Four of the older infection centers in the West were inspected during the trip. Three of the four areas, Pysht, Joyce, and Paschall's Ranch, are on the Olympic Peninsula in localities bordering either Puget Sound or the Strait of Juan de Fuca. The rust is believed to have invaded this region at least as early as 1918. The fourth area, Spirit Lake, is in southwestern Washington on the slope of Mt. St. Helens in the Cascade range. A report on the Pysht area was given in last month's News Letter (p. 10). The Joyce area, which is about 15 miles west of Port Angeles, supports scattered, open-grown white pine, Douglas fir, and cedar. Although no detailed account of infection development in this locality is available, the first known infection, discovered by Godding and Patty in 1926 was one small carker on 1923 wood. In 1938, after 12 years of intensification from Ribes bracteosum, R. divaricatum, R. sanguineum and R. lobbii, about half of the 20- to 30-year-old pines are dead and the remainder will die within a few years. Although there is evidence that cone production on these trees has been quite heavy in recent years, not one white pine seedling or small tree was found. Paschall's Ranch, located 6 miles west of Bremerton, is situated in a small valley opening with a fine stand of white pine, Douglas fir, and hemlock. The center of heavy pine infection around this ranch was located in 1927 through a quarantine inspector's interception of 2 healthy P. monticola in a shipment of evergreens

from the ranch owner. Correspondence on this prompted the owner to follow up by sending specimens of the disease from other trees on his property. The first examination of the pines included 50 trees around the ranch, all of which were infected, with an estimated average of 20 cankers per tree. Probably of 1930 origin, this center was built up by R. bracteatum, R. sanguineum and R. lacustre. By 1938, every one of the pines immediately adjacent to the ranch had been killed. In the uplands where Ribes are extremely scarce very little infection was noted. Although no careful check of upland infection was made in 1938, it appeared to have increased very little over the 2 percent reported in 1927. The original Spirit Lake infection center covered an acre of abandoned homestead clearing 4 miles west of the Lake and about 2 miles below timberline at an elevation of 2,700 feet. Introduction of the rust into this attractive recreational area occurred about 1920 through the medium of R. laxiflorum, R. bracteatum, and R. lacustre. The center was found in 1927 at which time only 14 pines had visible infection. An abundance of Ribes associated with an excellent stand of white pine above the infection center made it evident 11 years ago that rust spread would be rapid in this area. In 1938 it was observed that every white pine around the original center has been killed and that rust spread has even reached the last stunted western white pines and whitebark pines at timberline, at least 10 miles away. Of note in connection with this infection center is the abundance of pole and mature white pine that is being killed by bark beetles. It is evident that blister rust and beetle damage are closely associated but the extent to which weakening of the trees by the parasite is encouraging insect invasion was not evident. It is notable, though, that the combined forces of blister rust and beetles will in time completely remove white pines as the principal tree from extensive areas around Mount Saint Helen.

Spread of white pine blister rust in 1938, summary.--During the calendar year 1938, blister rust was found for the first time on either white pine or Ribes in 70 counties. Six of these counties are in the Southern Appalachian States, 60 in the North Central States, 2 in Montana, and 2 in California. The southern limits of the known infected region in the North Central States was extended from 1 to 3 counties in Ohio, Indiana, Illinois, and Iowa. In this region infection in 38 of the 55 counties occurred on the cultivated black currant (R. nigrum). The large number of counties in which the disease was found on this species shows its importance as a disseminator of the rust and the need for eradication in regions where white pines are valuable forest trees. The disease was found for the first time at 5 different points where inspections were made in Glacier National Park. This represents an eastward extension of the rust in Montana into Flathead and Glacier Counties. In California the rust was found to have spread southward another 35 miles during 1938 and is now present about 160 miles below the Oregon-California border.

Blister rust aecia found in January.--P. E. Wheeler reports finding "active" aecia on white pine in the town of Chesterfield, Mass., on January 13.

COTTON INSECT INVESTIGATIONS

Insecticides, with and without wetting agents, for boll weevil.--During 1938 four experiments were conducted by C. F. Rainwater near Florence, S. C., in an effort to find a substitute that would control the boll weevil and at the same time overcome objections to the use of calcium arsenate. Each experiment consisted of six treatments replicated six times on 1/20-acre plots arranged in a Latin square. The insecticides used were calcium arsenate, which was used in all four experiments for comparison with the others, nicotine bentonite, nicotine bentonite plus nicotine tannate, a fine synthetic cryolite, containing 90.8 percent Na_2AlF_6 and a coarse cryolite containing 78.3 percent Na_2AlF_6 . All the insecticides were applied as dusts with and without one or more of the following wetting agents and stickers: Vatsol, Areskep, Aresket, Lethane, and a dry gum containing a tapioca base. The first four were mixed with the insecticides at the rate of 1 percent by weight, and the gum at 5 percent by weight. A mixture of equal parts of calcium arsenate and calcium carbonate without a sticker or spreader was also used. Aphid infestations developed on the calcium arsenate plots and caused considerable shedding of leaves and fruit, whereas very little infestation developed on the nicotine plots. The plots dusted with fine cryolite developed heavy aphid infestations and the coarse cryolite plots medium aphid infestations. Statistical studies of the data showed that none of the wetting agents and stickers increased the effectiveness of the calcium arsenate or the nicotine compounds. A synthetic liquid sticker and spread (Lethane) did increase the effectiveness of the fine cryolite and made it comparable to calcium arsenate. Calcium arsenate, used alone or in combination with stickers and spreaders, and the fine cryolite were superior to the nicotine compounds, with or without stickers and spreaders. The nicotine compounds gave very little, if any, control. No significant differences occurred between calcium arsenate and the calcium arsenate-calcium carbonate mixture. From these studies and from general observations made throughout the season, it appears that cryolite might be developed into a satisfactory substitute for calcium arsenate in boll weevil control, provided that its dusting qualities are good and that the percentage of sodium fluoaluminate is high.

Survival of pink bollworm larvae in water.--Two floods from the Rio Grande, which occurred in the Big Bend area of Texas in September and October 1932, covered some 4,500 acres of cotton and carried large quantities of cotton out of the valley. The recent floods in July and September 1938 again provided a possibility of material infested with pink bollworm being carried out of the valley by flood waters. Tests to obtain information as to how long pink bollworm larvae can survive in water were conducted by S. L. Calhoun, of the Presidio, Tex., laboratory. Green and open cotton bolls, heavily infested with pink bollworm, were placed in containers and weighted down so they were continuously submerged in water, and in other tests were left to float free. Approximately 50 percent of the larvae in submerged green bolls were alive after 6 days. Some were alive through the 9th day, but all were dead on the 10th day. Some of the green bolls remained afloat, and 16 percent of the larvae were alive on the 16th day when the last sample was examined. Approximately 25 percent of the larvae were still alive in floating, open bolls on the 12th day when the last sample was examined, and it is probable that much longer survival would have been recorded had sufficient bolls been available for continued examinations. In submerged open bolls about 4.5

percent of the larvae were alive on the 12th day. Other investigations in Mexico have shown that a few larvae survived for 64 days in open bolls buried in the soil and completely covered with water. It is estimated that flood waters of the Rio Grande would travel from Presidio to the Gulf of Mexico in about 13 days. With records of cotton bolls remaining afloat and larvae surviving for at least 16 days, there is a possibility of infested material being carried from the Big Bend to the lower Rio Grande Valley. Inspections were made for cotton along the river bank during and following the 1932 floods, but none was found outside the Big Bend area. However, the fact that larvae can survive in bolls in water for sufficient time to be carried to the Gulf, and the discovery of pink bollworm infestation in the lower valley 4 years after the 1932 flood, present an interesting series of circumstances for speculation.

Pink bollworm hibernation studies.--Studies were conducted by H. S. Covitt and O. T. Robertson to determine the percentage of larvae going into the long-cycle stage at various periods in the fall. Beginning the first of September, 100 larvae that had recently issued from green bolls were installed daily in each of 2 cages through September 15. Similar daily installations were made in other cages during the periods September 16-30 and October 1-15. A total of 9,000 larvae were installed during the period of the test. The cages were examined on November 30 to determine the number of long-cycle larvae surviving in each installation period. The results of these examinations are recorded below.

Date installed :	Larvae :	Total larvae
	: recovered :	installed
	: Number :	Percent
September 1-15---	9	0.33
September 16-30--:	209	6.96
October 1-15-----:	602	20.03

As shown above, there was an increase in the percentage of larvae going into the long-cycle stage as the season advanced. Owing to floods and cleaning, it was impossible to continue the tests after October 15; however, the results indicate that an early maturity of the crop followed by an early fall field clean-up would reduce the larval population going into hibernation in the soil.

Field clean-up-machinery investigations.--A shaver-type stalk cutter, mounted on the frame of a two-wheeled cart duster was constructed and tested by W. T. Hunt, for use in field clean-up to reduce the overwintering pink bollworm population. The wheels of the cart were adjusted so as to straddle two rows. Two serrated cutting blades were attached to an extension of the frame about 3 inches above the ground on the inside of the wheels. The blades sloped back at an angle of about 40°, so that they would shed the stalks after cutting them. In operation the cutter straddled two rows of cotton, cutting the straddled rows and windrowing the cut stalks in the center. Although the machine left a few stalks that were not cut, it was considerably faster than hand methods. Ordinarily one man can cut about 3/4 of an acre with a machete or hoe, as compared to 8 or 12 acres with the machine.

Observations indicate that there was very little, if any more shattering of bolls and squares where the cart machine was used than where the stalks were cut by hand. This cart-type cutter was easier to handle, lighter in draft, and left fewer standing stalks than the sled-type cutter formerly used.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Pink bollworm eradication in the Salt River Valley.--The field clean-up campaign in the area east of Gilbert, Ariz., where an infestation of pink bollworm was found in the 1933 crop, has been continued. This field cleaning, which consists of cutting and burning cotton stalks, together with bolls, locks of cotton, and other material, which has fallen or shattered to the ground, is the initial procedure in the eradication program for the infested area. In addition to stalk cutting done by hand with machetes, six especially made sled cutters have been used in this phase of the work. A stalk-burning machine, or incinerator, has also been in operation. A very thorough cleaning job has been accomplished with the incinerator when the fields have been dry enough for its use. The dried cotton stalks are used as fuel, and as the machine is moved along the cotton rows all surface material is burned, and the hot blaze given off kills any pink bollworms which might have entered the top soil. Clean-up operations were first begun in the fields known to be infested, but have now been extended to adjacent fields and several miles beyond. Recent reports show that cleaning has been completed on 1,724 acres, and stalks have been cut on 2,361 acres. Work has been interfered with from time to time, owing to unusual weather conditions in the valley. Cold weather, accompanied by considerable rain and snow, has prevailed over the section during the last few weeks.

Survey work with autogiro in the Coastal Bend area.--After it was found, through examinations of gin trash from the 1933 cotton crop, that pink bollworm infestation had spread to the Coastal Bend area of Texas, an eradication program was inaugurated in an effort to stamp out this initial infestation. Owing to very similar climatic and crop development conditions, practically the same program as that followed in the lower Rio Grande Valley was put into effect. An important part of this plan called for destruction of cotton stalks in all cultivated fields after harvesting had been completed. The destruction of all soca or sprout cotton occurring in the area was also necessary. In many cases this sprout cotton occurs in abandoned fields in isolated places and cannot readily be seen from the ground. In an effort to locate all such fields the autogiro, which had been used in making a survey in the lower valley, was brought to the Corpus Christi area for the purpose of making similar observations. Flights were begun on January 25 and the survey work was completed on February 2. Information of real value was obtained. Three fields were found which had the stalks still standing, and in addition 2 unknown fields were located in the southwest corner of Brooks County; 25 scattered fields in Jim Wells County; 7 in Mueces County; and 4 in Kleberg County. In addition to the information, the survey enabled the inspectors, who acted as observers during all flights, to familiarize themselves with the cultivated areas under their supervision.

Notes from the Big Bend of Texas.--Pink bollworm damage was extremely heavy in the Big Bend section during the last crop season, and it is believed that the mild winter of 1937-38 accounted in a large measure for this condition. The present winter has been the coldest in this section of the State for a number of years. At Presidio the temperature has been below freezing

for a total of 414 hours through January. During this period there have been 39 hours of temperature below 20°. It is believed that this extremely cold weather, together with considerable moisture which has been present in the soil, will result in high mortality of the pink bollworm. An effort was made to reduce the number of hibernating larvae through the stalk-destruction and field-cleaning program carried on in the fall. Retarded planting of the coming crop, another part of the 2-year control plan, is expected to be carried out. A State Proclamation, which sets the planting date at April 20, has been distributed throughout the area. Preparations for the new crop are going forward in every part of the district. It appears certain that about half of the cotton acreage in the Big Bend will be planted to Accla variety.

Reports from southern Florida.--Good progress continues to be made in the wild-cotton eradication work in southern Florida. The War then section was completed during the week and a second cleaning was made of colonies in the Key West section and certain keys in this area. Several mature wild cotton plants were found and considerable vegetation was cleared off in order to hasten germination of any cottonseed remaining in the soil. Work was completed during the week on the ocean side of Plantation Key and the inside of Key Largo. An inspection of 500 bolls from Lignum Vitae Key was made, resulting in the finding of 4 pink bollworms. Several hundred bolls from the lower end of Key Largo were also examined and 6 pink bollworms were found. Work schedule at Cape Sable is still being maintained. The first cleaning will be completed about a month earlier this year than last. It is not desired to complete the second cleaning too early in the spring, and the number of workers may be further reduced. Crews in Monroe and Hillsborough Counties continued to do considerable scouting in their respective areas. The Pinellas County crew will probably complete their first cleaning of the season during the next 2 weeks. The autogiro, which has been used in quarantined areas of southern Texas, arrived in Miami on the afternoon of February 4. The first observation flights were made early in the week after some necessary repairs had been made to the machine. The primary purpose of these first flights was for general observations and to familiarize the various inspectors with the areas they are to work. Some doubtful sections, however, were noted, and it is planned to check these areas as soon as possible. During the latter part of the week observations were made over the Cape Sable area. Flights over the southern portion of the Ten Thousand Islands section will follow, after which additional flights will be made over the Cape Sable area. It appears that about 3 weeks will be required to complete the survey in southern Florida.

Thurberia plant eradication in Arizona.--The work of locating and destroying colonies of Thurberia plants, host of the Thurberia weevil, which attacks cultivated cotton, was continued in the Mountain ranges of southern Arizona throughout January. Toward the end of the month work in Ventana Canyon had almost been completed. During the period a total of 106,506 plants was removed from 1,500 acres. Forty (40) acres of this land consisted of a section of mountains over which a severe forest fire passed in 1937, which almost completely destroyed all the native plants. On this 40 acres a total of 46,231 Thurberia plants of all sizes, from seedlings to plants 2 and 3 feet in height, was removed. This number of plants consisted

of 8,318 large, 36,022 small, and 1,893 seedling plants. Toward the end of the month preparations were under way to begin eradication operations in the vicinity of the Continental Ranch, about 28 miles from Tucson. This is the first work in connection with the program which calls for the removal, as far as possible, of *Thurberia* plants near the cultivated cotton-growing areas of the Santa Cruz Valley, where an infestation of *Thurberia* weevil was found in a large number of fields during the last season.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tobacco moth capable of subsisting on food materials other than tobacco.--In connection with a study of control methods for the tobacco moth as a pest in growers' packhouses, J. P. Vinzant, of the Richmond, Va., laboratory, found that under optimum conditions of temperature and humidity many larvae of *Ephestia elutella* Hbn. completed their life cycle and emerged as adults when fed on peanut meal, rolled oats, cottonseed meal, horse feed (consisting of cracked corn, oats, bran, molasses, and salt), rye seed, and wheat bran. No emergence of moths took place in cages where the larvae had fed on barley and scratch grains commonly used for chicken feed. Samples of several brands of hog and chicken feed, cracked corn, rye, and wheat, collected in the barns of tobacco growers in North Carolina, where an outbreak of the tobacco moth occurred in the packhouses, failed to disclose any infestation or moth emergence of *E. elutella*. It is apparent from these tests that it is possible for the tobacco moth to subsist on substances ordinarily found in or near tobacco growers' packhouses, but at the present time this phenomenon is not taking place to an extent that would account for the damage caused by the tobacco moth in growers' packhouses in certain counties of North Carolina and Virginia in the fall of 1938.

Tests with metaldehyde against slugs in greenhouse.--C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, found, in preliminary trials under greenhouse conditions that metaldehyde, when made up as a bait with wheat bran, attracted large numbers of slugs and resulted in heavy mortality. The bait was made up at the rate of 2 ounces of wheat bran, 1 gram of metaldehyde, and 30 cc of water. Sunlight the day following the application of the metaldehyde bait seemed very necessary in order to produce the desiccation of the slugs that became affected after feeding on the bait. On the other hand, indications were that, if cloudy weather prevails, some recovery of slugs may occur the next day or two after treatment. Comparable tests with paraldehyde and paraformaldehyde, also known as trioxymethylene, showed that, although these materials, made up in essentially the same manner as the metaldehyde bait, apparently possessed some degree of attractiveness to slugs, they had little or no effectiveness against these pests.

Increase in pea weevil infestation in Washington and Idaho in 1938.--According to a report submitted by T. A. Brindley and F. G. Hinman, of the Moscow, Idaho, laboratory, the annual summation of the data collected on infestation by the pea weevil (*Bruchus pisorum* (L.)) in the Palouse area in Washington and Idaho, as obtained from the records of the Pea Grading Service of the Bureau of Agricultural Economics, cooperating with the Department of Agronomy of Idaho, disclosed that on an average approximately 12½ percent of the peas examined were found to be infested by the weevil. This

involved an examination of 573 graded crops. This figure indicates an increase of approximately 5 times the average pea weevil infestation present in a comparable area in 1937 and indicates that the 1938 infestation of the pea weevil was one of the most severe on record. The marked increases appear to be attributed principally to two influences: (1) A mild winter (1937-38) which allowed a high rate of survival of the adults; (2) the pea acreage in the Palouse area was reduced greatly in 1938 and the average yield per acre was considerably less than during previous years, apparently resulting in a higher degree of concentration of the weevil population on the relatively small number of peas available for oviposition. The following tabulation shows the average and the maximum infestation by the pea weevil in Washington and Idaho and in the combined area for the period 1934-37.

Year :	Washington :	Idaho :	Average for		
	Average :	Maximum :	Average :	Maximum :	territory
	Percent :	Percent :	Percent :	Percent :	Percent
1934---	3.64 :	33.2 :	4.48 :	55.6 :	3.95
1935---	2.77 :	27.2 :	4.41 :	41.5 :	3.35
1936---	1.93 :	17.3 :	4.18 :	35.1 :	2.69
1937---	2.21 :	37.1 :	3.50 :	29.7 :	2.57
1938---	9.77 :	56.0 :	19.57 :	70.5 :	12.51

Cryolite dust mixture effective against corn earworm on lima beans.—

In summarizing the results of an experiment performed on the Eastern Shore of Virginia, designed to determine the number of insecticidal treatments necessary to control Heliothis obsoleta (F.) on Fordhook lima beans and to test the relative effectiveness of a cryolite-corn meal bait, in comparison with a cryolite dust mixture for controlling this insect, it was indicated that three treatments of a cryolite-talc dust mixture, starting the first treatment when the plants were beginning to bloom and applying the later treatments at approximately 14-day intervals gave the best control of the corn earworm, as determined by the reduction in the number of wormy pods in the treated and untreated plots grown under comparable conditions. Cryolite-corn meal bait scattered on the plants by hand at the rate of 50 pounds per acre per treatment applied at the same time and time-interval as the cryolite-talc dust mixture was not as effective as the latter, the reduction in the wormy pods per plant being 52 percent with the cryolite-corn meal bait, as compared with an average of 89 percent reduction in the plots where the cryolite-talc dust mixture was applied. When the cryolite-corn meal bait was scattered down the middles of the rows, using the same dosage as was applied to the plants, a reduction of only approximately 6 percent in wormy pods was obtained, indicating the necessity of applying this material directly to the plants.

Plant sugar beets early to combat beet leafhopper.—As the result of detailed tests performed during the season of 1938, in south-central Idaho, L. G. Papp and R. W. Hoffmaster determined that in the presence of infestations of Eutettix tenellus Bask. the earliest planted sugar beets gave the highest yield, the lowest percentage of beets developing disease, and the highest percentage of beets that recovered from the disease. These experiments were staged with one variety of nonresistant sugar beets and three

varieties of resistant sugar beets. The beets were planted at 12-day intervals, beginning on March 15. Throughout the season there were more leafhoppers on the nonresistant than on the resistant varieties. There were approximately 18 percent more leafhoppers in the second planting of beets than in the first planting and 50 percent more in the second than in the third planting. Early infestation by E. tenellus caused a very high percentage of all varieties of beets to develop obvious disease symptoms early in the season. The highest percentage of disease occurred in the planting which maintained the highest leafhopper population. Very few beets completely recovered from the disease, which was probably due to the early infection. Of the number of beets which recovered, approximately 78 percent were from the first planting. The beets which recovered from the onset of curly-top disease weighed approximately 61 percent more than did the diseased beets which did not recover. Healthy beets weighed on an average approximately 3 pounds each, which at this rate would have given a potential yield of approximately 41 tons per acre had all the beets been healthy. In general, the early planted beets had lower leafhopper populations, a higher percentage of recovered beets, and gave better yield.

FOREIGN PLANT QUARANTINES

Merodon sp. larvae in Leucojum bulbs.---Four larvae of Merodon sp. were taken from Leucojum sp. bulbs from Holland at the port of New York on September 29, 1938. This represents the fifth time that this insect has been taken from Leucojum bulbs. Three previous interceptions have been made at the Inspection House, Washington, D. C., and one at San Francisco. All infested bulbs were from Holland.

A handful of weeds.---On December 14, 1938, while inspecting at the San Juan airport a local airplane returning from St. Croix, American Virgin Islands, the alert eye of Inspector Jose Luciano noted a heavy wisp of weedy growth caught in the plane's landing gear. On taking off in St. Croix the plane had bounced into a weedy portion of the landing field and had carried away a stringy mass of straggling vegetation. This accidentally acquired plant importation remained with the plane until it reached San Juan, where it was detached by Mr. Luciano and brought to the office for examination. It consisted mainly of a vine-like trailer, Ipomoea quinquefolia, with portions of three other weed plants and six grass species mixed in. On the Ipomoea was found a distinct leaf-spot disease, and the dying stems were covered with fungus pustules. One of the two seed capsules present on two fragments of another plant contained a living larva and in a third plant (probably Mimosa pudica) eggs and evidence of larval feeding were observed in the leguminous pods.

Termites in the mails.---On October 22, 1938, a package was inspected in San Juan, addressed to a person living in New York City. This package was found to contain a small termite nest filled with living termites which were later identified as Nasutitermes (N) costalis Holmg., West Indies. Why were these termites being sent to New York? Was it idle curiosity on the part of the addressee to see a termite nest? Inquiry revealed that it is common practice in Puerto Rico to burn a termite nest and inhale the fumes as a medicinal remedy for chest ailments. Others boil the termites in water and drink the broth expecting some curative result.

Lepidopterous larvae on medicinal shoots.--Living larvae of the geometrid Synchlora frondaria Gn. were collected on November 4, 1937, in Puerto Rico, on shoots of Adenocroton multifidum (Tartag. exotico). The shoots originated at Rio Piedras, P. R., and were for medicinal purposes. The larvae were found when the shoots were presented for examination before being mailed to the continental United States.

Entomological interceptions of interest.--Two living larvae of the fruitfly Anastrepha monbini raeoptans Sein were intercepted at Mobile, Ala., on September 9, 1938, in a mango fruit in ship's stores from Jamaica. Fourteen living and four dead larvae of an Anastrepha species were intercepted at New York on October 24, 1938, in two mango fruits in baggage from Colombia. Two adults of the weevil Aulon pomonae F. were taken at Chicago, Ill., on September 21, 1938, in vetch pods in cargo from England. A living specimen of the lygaeid Orthaea vicinalis (Dist.) arrived at Seattle, Wash., on October 4, 1938, on an orchid (Cattleya sp.) leaf in cargo from Colombia. Specimens of the thrips Frankliniella cubensis Hood and Heterotarips sarricatus Hood were intercepted at Miami, Fla., on September 5, 1938, on rose blooms in baggage by airplane from Haiti. A living adult of the weevil Attelabus curvinus Gyll. was found at New Orleans on September 30, 1938, on a banana fruit in cargo from Mexico. A living specimen of the pentatomid Cochlerus marginatus (F.) was taken at Galveston, Tex., on November 7, 1938, among bananas in cargo from Mexico. Specimens of the ant Phaenocarpa nodus F. Sm. arrived at Sumas, Wash., on October 20, 1938, with lily bulbs in cargo from Japan. A living larva of the wine moth (Polychrosis botrana Schiff.) was intercepted at New York on November 4, 1938, on a grape berry in baggage from Hungary. This tortricid, which attacks the blossoms and fruit of the grape, occurs in Europe, Asia, and Pacific Islands. Living specimens of Taeniothrips oricne (Haliday) were found at Buffalo, N. Y., on August 18, 1938, on heather in the mail from Scotland. Two living adults of the bruchid Pachymerus luteomarginata (Chev.) were intercepted at Washington, D. C., on October 24, 1938, with seed of Desmanthus polycanthos in the mail from the Canal Zone.

Pathological interceptions of interest.--Spotting of tomatoes from Argentina, examined at Boston on January 20, seemed to be due to Bacterium vesicatorium Doidge. Ditylenchus dipsaci (Do Man) Filipjev and Helminthosporium allii Campanile were found on garlic from Singapore, Straits Settlements on January 20, at Boston. Heterodera morioni (Cernu) Godley was found in galls on beets from South Africa taken on January 31 at Philadelphia. Malayspora abietis-copraeum Tubouf was intercepted at the El Paso foot-bridge on January 12, on willow leaves from Mexico. Phoma citricarpa McAlpine was found on oranges from Australia on January 6 at New York. Peronospora discolorum (Tode) James was found on August 4, 1938, at New York on rose cuttings in baggage from Italy. On January 27 Phytophthora infestans (Mont.) DeBary was found at New York infecting a tomato in a cargo shipment from Canary Islands. A diseased pumpkin from Barbados, examined at New Orleans on January 23 was found to bear numerous sclerotia of Sclerotium rolfsii Sacc. Garlic from Singapore, Straits Settlements, examined at Boston on January 20, was covered with small black sclerotia determined as Sclerotium sp., but resembling the sclerotial stage of Botrytis squamosa Tulver. Thielaviopsis basicola (Berz.) Ferraris was intercepted on January 11 at El Paso in sweet-potatoes carried by a pedestrian from Mexico. Uredo caridii P. Henn. was

intercepted at San Francisco on a number of plants of Oncidium cavendishianum in each of four special permit shipments from Mexico on May 13, 14, 17, and 18, 1938. A rust found on Tournefortia sp. in air express from Wake Island on February 22, 1938, at Honolulu was determined as Uredo sp. The specialist to whom the material was forwarded expects to name and publish the new species later.

DOMESTIC PLANT QUARANTINES

Quarantine activity discussed at December meeting of entomological association.--The present quarantine structure and methods of nursery inspection were given thorough consideration by the section on plant quarantine and inspection, at the annual meetings of the American Association of Economic Entomologists held in Richmond last December. At the request of State officials, the papers presented which relate to quarantine and inspection activities have been mimeographed and distributed. Such papers were as follows:

What will be the Next Step taken toward Progress in Nursery Inspection?
E. L. Chambers, State entomologist, Madison, Wis.

The Plant Quarantine Act and Quarantine No. 37. Lee A. Strong,
Chief of Bureau.

Trends in Pest Control Regulatory Action. M. S. Yeomans and
Milledge Murphey, Jr., Georgia Department of Entomology,
Atlanta, Ga.

Regulatory Laws and State Boundaries. R. P. White, executive secretary,
American Association of Nurserymen, Inc., Washington, D. C.

Regulatory Measures as They Affect Transportation of Plants and Plant
Products by the Railroads. W. C. Kendall, chairman, Car Service
Division, Association of American Railroads, Washington, D. C.

Post Office Cooperation in the Observance of Plant Quarantines.
Nelson B. Wentzel, superintendent, Division of Classification, Post
Office Department.

White-fringed beetle quarantine activities.--A cooperative attitude on the part of the public toward the activities concerned with the enforcement of the recently issued Federal quarantine on account of the white-fringed beetle is the subject of comment on the part of inspectors in the regulated areas. Personal contacts have been made by the inspectors with carriers, nurserymen, produce dealers, farmers, and others to familiarize them with the provisions in shipping from the regulated areas, and the boundaries of such areas are being posted with quarantine signs. In the New Orleans nursery area, inspectors are devoting their attention to the supervision of the potting of nursery plants in sterilized soil, and the New Orleans markets are manned at all times to insure that produce moved by truckers meets the conditions of certification. The work at Mobile is concerned with that part of the city under regulation, comprising the railroad yards, docks, mills, retail and

wholesale establishments, and several blocks of the residential districts. Throughout the regulated areas of the infested States, the movement of restricted articles, with the exception of nursery stock with soil, was light in January and patrol inspectors found few violations.

White-fringed beetle inspection.--Larval survey for the white-fringed beetle was continued in January in nurseries and adjacent properties in the vicinity of East Baton Rouge and St. Tammany Parishes, La.

White-fringed beetles still found in adult stage.--White-fringed beetles were collected throughout the month of January at Gulfport, Miss., and two were found in New Orleans on January 11.

Quarantine restrictions on the white-fringed beetle.--Circulars B. E. P. Q. 485, 486, 488, and 489, all relating to the white-fringed beetle quarantine, were issued in January. These modifications relate to part-year removal of certification requirements for specified articles from designated portions of the regulated areas; treatment of potted plants and potting soil; and reshipping from regulated areas, restricted articles originating in foreign countries.

Transit-inspection activities.--A study was recently made to ascertain the volume of express and Railway Mail Service shipments coming into Chicago from areas regulated under Federal quarantines. Some 15,000 sack labels were collected over a 24-hour period, representing an average day. The time, within half-hour periods, was determined as to when the parcel-post shipments were available for inspection at conveyor belts and chutes, and the tours of inspection arranged accordingly. Violations found by transit inspectors in December totaled over 600, more than two-thirds of which originated in the gypsy moth quarantine area. One of the violations intercepted in New York was consigned to Puerto Rico. Although January marked the usual low shipping point in the year, 63 apparent violations were found that month. Interdealer requirements in the Japanese beetle area are checked and 2 such infringements were reported. Transit inspectors at Pittsburgh, in their contacts with express car loaders, took advantage of the seasonal lull by interesting these men in the plant-quarantine work. With a better knowledge on the part of these men of the type of shipment which needs to be inspected, more material has been held for inspection without interfering with the loading.

Peach-disease control activities.--Tree-removal work in January was conducted in 41 counties in Alabama, Arizona, Arkansas, California, Colorado, Georgia, Mississippi, Tennessee, and Utah. With the increased force of over 400 relief laborers, there were removed from the above States over 735,000 abandoned and escaped peach trees, over 2,700 mesquite and 138 phony peach trees. January 14 marked the completion of the removal in Mississippi of all phony trees found in the 1935 inspection season.

California peach-mesquite survey.--State survey work in 26 counties in California in 1935 resulted in finding no peach mesquite disease, according to a report from the Bureau of Plant Pathology of the California State Department of Agriculture. Over 2,000,000 stone-fruit trees were represented in the plantings inspected.

Alabama quarantine on phony peach disease revised.--Standard areas and uniform requirements are maintained in the phony peach disease quarantine of the State of Alabama, which was revised effective February 9. There have been eliminated from the regulated areas such parts of Maryland and Oklahoma as were formerly under regulation, one county each in Illinois and Missouri, and three in Kentucky, in consideration of their apparent freedom from the disease for the last 3 years.

Progress in sweetpotato weevil eradication.--The eradication and control measures for the sweetpotato weevil, which have been conducted in Alabama, Mississippi, Georgia, and Texas cooperatively with these States since July 1937, is effecting a sharp decline in such infestations. Reinspections were made in 1938 of the entire area in which survey and control measures were conducted the previous year, and it was found, the project leader states in his annual report, that of the 477 infestations which had been located in 1937, 430 of them, or 90 percent, were apparently eradicated. Cultural practices were, for the most part, the means of effecting such clean-up. Safeguards as to the growing, storing, and movement of the host plants within the regulated areas come within the provisions of the standardized quarantines adopted by the four above-mentioned States.

Sweetpotato-weevil inspectors meet.--Plans for field activities in the current year, as well as the work of the past season, were discussed at a general meeting of Federal and State inspectors at Gulfport, Miss., on January 27 and 28. K. L. Cockerham and Stephen S. Easter, on sweetpotato weevil investigational work at Sunset, La., were present also.

Citrus canker eradication.--Inspection for citrus canker was resumed in Louisiana on January 16, with a force of nine experienced inspectors, five Federal, and two State men, the fall and winter activities of the project having been devoted to Texas areas. One infection of citrus canker was found by Louisiana State inspectors prior to January 16 in Terrebonne Parish. Work is continued in Texas. The eradication of abandoned citrus trees at Carrizo Springs, Tex., has been completed, and inspection was continued in Galveston and Brazoria Counties.

Power dusters reduced cost of Mormon cricket control.--The most striking development in the 1938 Mormon cricket control operations, as compared with those of former years, was perhaps the large increase in the number of power dusters operated and the marked decrease in the number of hand dust guns used. This development, according to the field project leader, was primarily responsible for the decreased cost of control, as the hiring of labor is the most costly item in the expense of control and each power duster displaced from 20 to 30 laborers.

Grasshopper control activities outlined for 1939.--A tentative program for grasshopper control in 1939, contingent on the availability of Federal funds, has been outlined following the conference of Federal and State officers held at Omaha last November. Federal emphasis will be placed on crop protection, as heretofore. The program varies but little from that of 1938, except as to areas in which the dominant grasshopper species show strong migratorial tendencies and where, owing to the sparsity of the human population and the existence of large areas of abandoned or reverted lands, it

would be impossible for the local ranger to carry out successful control. In these areas a joint Federal-State program is proposed, which will undertake responsibility for the application of bait. Activities directed against the two principal migratory species will be extended to concentration grounds of nymphs and adults in areas where effective control is believed to be feasible and practicable. Such operations, it is anticipated, will embody the area infested with Disosteira longipennis Thos., comprising parts of Colorado, New Mexico, Oklahoma, and Texas and that infested with Malanoplus mexicanus Souse., comprising parts of Montana, North Dakota, South Dakota, and Wyoming.

CONTROL INVESTIGATIONS

Nicotine gas toxicity increased.--H. H. Richardson and A. H. Casanova, of the Beltsville, Md., laboratory, have found that the addition of carbon dioxide to nicotine gas increased the speed of paralytic action of the fumigant against the peach aphid (Myzus persicae (Sulz.)). Final mortality, however, was increased only to a small extent. Further tests have again indicated the detrimental effect of high humidity in nicotine fumigation. Under the conditions of the laboratory air-flow method of testing, this is only noticeable at the lower nicotine concentrations (.0052 mg/L.) but under practical conditions where the nicotine is applied in one large dose it is apparent at the higher concentrations.

Homologs not superior to paris green.--Twelve copper arsenite compounds similar to paris green have recently been tested by the Sanford, Fla., laboratory to determine their usefulness as possible substitutes for paris green. The materials, prepared by F. E. Dearborne, of the Division of Insecticide Investigations, are combinations of copper arsenite and copper salts of different fatty acids. The toxicity of all the samples was high but those containing salts of the higher fatty acids were more difficult to use, because of their waxy nature. With regard to toxicity, no significant difference was found between any of the samples and paris green. All the samples were sprayed on young bean, collard, and squash plants and were almost equally injurious. It is concluded, therefore, that the compounds have little promise as substitutes for paris green.

INSECTICIDE INVESTIGATIONS

New method to replace Gutzelt method for arsenic.--A new method for determining small quantities of arsenic has been developed in the Division of Insecticide Investigations which, because of simplicity, accuracy, and other advantageous features, it is believed will supplant the long-used Gutzelt procedure. The method is essentially an arsine evolution, followed by absorption of the arsine in mercuric chloride and an iodine titration. The time required per determination is approximately 7 minutes, whereas the Gutzelt requires at least 1½ hours. This method is capable of determining from 5-500 micrograms (0.005-0.500 mg.) As_2O_3 with an average recovery of 99.5 percent and a standard deviation of 0.6 percent. The procedure is not limited to a sample of 50 ml volume, as is the case with the Gutzelt, but can handle up to 60 or 70 ml samples.

Renewed studies on the noncrystalline constituents of derris and cube.--Extractives prepared from derris and cube contain, besides rotenone, principally deguelin. Deguelin has never been obtained by direct crystallization, but is only obtained in the optically inactive form when the extractives are treated with mild alkali. Insecticidal tests have shown deguelin to be the constituent next in importance to rotenone and, as previous work in the Division has indicated that deguelin exists in the plant in the *levo* rotatory form, a renewed study has been undertaken by L. D. Goodhue to obtain this form in the crystalline state. Extractives that have been freed of rotenone and toxicarol have been subjected to distillation in very high vacuum (pressure = .001 mm). The distillates obtained consisted largely of *levo* rotatory deguelin in amorphous form and so far all efforts to crystallize the material have been unsuccessful. In the course of the work it has been discovered that inactive deguelin forms solvates and, just as is the case with rotenone, the compound formed with carbon tetrachloride has been made the basis of a new method of estimating the deguelin content of derris and cube roots. Thus carbon tetrachloride differentiates between optically active rotenone and optically active deguelin to permit the separation and estimation of the former, and then after racemization, for which a convenient method has been developed, gives the inactive deguelin.

BEE CULTURE

More reasons why American foulbrood is hard to eliminate.--During the past season observations were made by A. W. Woodrow, of the Intermountain States Bee Culture Laboratory, Laramie, Wyo., on the activity of bees in the removal of the remains of brood dead from American foulbrood. He reports: "Calculations were made to determine whether the different colonies varied in the time required for the removal of diseased material from the cells, and whether this was closely related to the successful reduction of disease within the colonies. The average time required for complete removal of diseased brood ranged from 1.2 to 10.9 days for the various colonies. These values are in fairly close agreement with those obtained last year. The colonies having the least diseased brood gave the lowest average time but most of these were examined more frequently than those with more disease. The colonies having more disease apparently required more time as the number of diseased cells increased in them. As the averages obtained are based only on cells in which complete removal was attained, they only indicate roughly how long diseased material remains in colonies. The rapidity with which diseased cells were cleaned out indicates that diseased cells found on one inspection were not likely to be found later when inspections are spaced several days apart. The appearance of diseased cells within a colony presents a progressive and changing picture, rather than an accumulative one. The number of diseased cells present in a colony at a particular time do not show how many cells have appeared but only indicate how much brood is affected at that time. In ordinary routine examinations made at intervals of several days or weeks, many diseased cells may appear and be cleaned out before they are seen. Light infections under these circumstances may be undetected entirely when infrequent inspections are made for the presence of disease. Small particles of diseased brood are frequently present at the bases of cells which are being cleaned out by the bees, but these are extremely difficult to detect and probably are

was seen in ordinary colony inspection. These factors probably help to explain why it is so frequently a difficult and prolonged fight to eliminate American foulbrood completely from an apiary, particularly one in which the initial infection was light."

Giving water may aid package bees at high temperature.--Investigations by Mr. McGraw, assisted by R. J. Stokes, Jr., on the development of standard survival test methods for adult bees indicate that at 111.3° to 106° F. bees will live longer if water is available to them, in addition to a sucrose solution, than they will without it. The following is from a report on their work for the last quarter: "Tests on the relation of temperature to the longevity of caged bees were begun this quarter. One test was begun October 6 with cabinets operating at 111.3°, 105°, 102.6°, and 97.9° F. Relative humidities of 23-24 percent were maintained by the use of calcium chloride solutions. Five cages of bees were placed in each cabinet. All were fed 50 percent sucrose solution and extra water was given in outside feeders set on the third screen of the cages. The bees held at 111.3° were all dead at the end of 3 days, but probably died in less than 2 days. The second day was Sunday and no observations were made. The bees at 106° F. all died in an 8-day period. Some of the bees at 102.6° lived 3 weeks. Only a few bees in most cages at 97.9° and died in 3 weeks. The mortality at the temperature for the 3 weeks ranged from 5.4 to 17.8 percent. A large quantity of water was used by the bees at the higher temperatures. In some cages the bees did not seem to obtain the water readily; in other cases the water supply became exhausted between observations, even when three vials of water, each containing about 20 cc, were supplied. . . . As there was considerable variation in the death rate in the various cages in this test, probably related to the water supply, it was terminated at the end of 3 weeks and another was begun." In the new test the bees had free access to water at all times. Two results are shown in the following table.

Temperature	Relative humidity	Water only	50 percent sucrose only	50-percent sucrose and water	No. 1	No. 2	No. 3	No. 4
°F.	Percent							
112	16	O.K. at 6 1/2 hrs.	Half dead at 6 1/2 hrs.	All four cages in good condition at 6 1/2 hrs.				
--	--			All cages: All bees dead at end of 1 day.				
		Average length of life in days; food as in columns above.						
106-----	17	2.0	1.0	1.3	1.6	1.6	1.3	
104-----	17	3.0	1.5	5.2	9.0	4.1	5.8	
100-----	18	4.0	2.1	29.6	31.4	29.1	32.9	

1/ Relative humidity subject to correction for position of bees which will raise it about 3-5 percent.

2/ Average estimated, as not all bees have died.

The report continues: "The bees fed sucrose solution with or water in each of the cabinets died very quickly than those given water without sucrose solution. The cages were filled the afternoon of November 15 and placed on a laboratory table until the next morning, when they were placed in the cabinets at different temperatures. During this period all were fed 50 percent

sucrose solution and water. The need for water at the higher temperatures is clearly evident. The length of time required for starvation was increased as the temperature was lowered. Some bees fed 50 percent sucrose solution and water in the cabinet operating at 100° are still alive, but the average length of life is estimated to be about 29 to 32 days for these four cages. Death rates have been increasing rapidly during the latter part of the exposure period. Mass examinations were made of the intestinal content but no *Nosema* or *Malpighamoeba* or other abnormality was found. Numbers of bacteria were present but no more than were observed in dead bees taken from normal colonies. Some bees removed from the cages at the lowest temperature in the latter part of the period were well distended with feces, but only a few discharged fecal material before death occurred. The shorter length of life of the bees fed only sucrose solution at these temperatures suggests that package bees may be able to withstand high temperatures much better if water is available to them in addition to sucrose solution, or if the concentration of the sirup provided is changed according to the conditions to be met. The sirup should be lighter for hot weather and heavier for cool weather. If water were provided, the bees would have the opportunity of making the adjustment themselves."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Interesting beetle larva added to collection.--A coleopterous larva of unusual scientific interest was intercepted in January by the Division of Foreign Plant Quarantines. The inspectors at New York found the specimen under the bark of a Primavera log, from Guatemala. The larva appears identical with that of *Physeia setosa* Chaud., described by van Emden in 1936, and in all likelihood belongs in the genus *Physeia*. Insofar as is known the specimens which van Emden had and the one intercepted at New York are all that are known of this group in the world. The genus belongs in the Carabidae, tribe Ozaenini, the members of which are reported as inhabiting ants' nests, usually in the tropics. This larva is of particular scientific interest because it is intermediate between the Carabidae and Paussidae and definitely establishes the close relationship of these two families.

The scientific name for the tomato worm.--The taxonomic and nomenclatorial problems involved in this question were recently carefully investigated in order to permit an authoritative reply to a request from the Division of Truck Crop and Garden Insect Investigations. It was concluded that *Protoparce sexta* (Joh.) is the proper combination.

Addition of Tabanidae to National Collection.--An exchange of specimens has been made with Prof. P. A. Buxton, of the London School of Hygiene and Tropical Medicine, whereby 145 specimens of 69 species of Tabanidae, 31 of which were new to our collection, were received. Most of the species were African, although some Oriental and Palaearctic species were included.

Ectoparasites from island of Guam.--Two well-known ectoparasites of the dog--the brown dog tick (*Rhipicephalus sanguineus* Latr.) and the dog flea (*Ctenocephalides canis* (Curt.))--were recently sent in for identification from the island of Guam. They were collected by R. G. Oakley.

